

# NEW HAVEN EF-4 VIRGINIANS

by C. A. Brown







Opposite Page: EF-4s #301 and #304 were photographed under the Cedar Hill coaling tower. Note the Faiveley pantograph on motor #301. Photo by J. W. Swanberg. Above: Third generation Virginian Railway locomotive #141 poses on the shipping track at Erie, Pennsylvania awaiting pick-up by the local freight. GE photo. Below: Installation of short hood at erecting shop, Erie, Pennsylvania. GE photo.

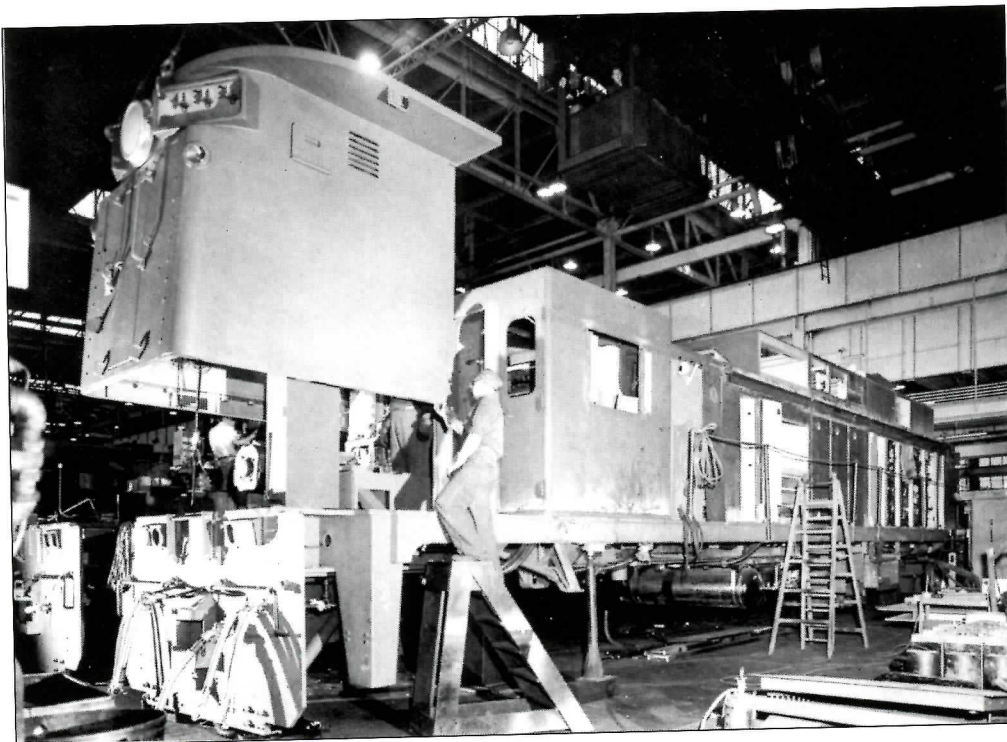
In Shoreliner Volume 11 Issue 3 of 1980 we published an article by the late Charles A. Brown entitled **The New Haven EF-4s "Bricks"**. In retrospect, the title was not accurate, as these motors were universally known by New Haven employees and rail enthusiasts as the "Virginians". In *The Virginian Railway* by H. Reid, it was stated "The rectifier locomotives had the beauty of misshapen bricks", and we believe that Mr. Brown's choice of title was influenced by this. The enhanced article has been retitled **The New Haven EF-4 Virginians**.

The article in its original form was published nearly 40 years ago. We now have more information and errors in the original article have been corrected.

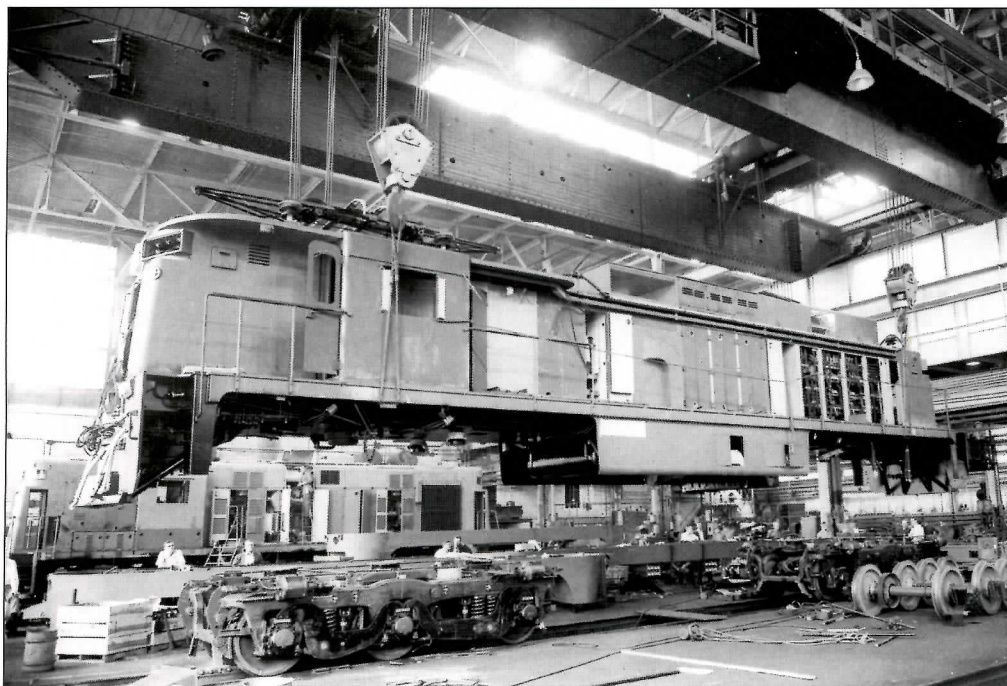
We are assisting the Illinois Railroad Museum in their quest to raise funds for cosmetic restoration and repainting of former New Haven EF-4 #300 into its New Haven paint scheme.

Special thanks are in order to J. W. Swanberg for his invaluable assistance in updating this article and providing additional material.

Ed







**Lowering locomotive assembly onto trucks at Erie, Pennsylvania. GE photo.**

The New Haven class EF-4 electric freight motors were unique in many respects:

- They, together with the EP-5 passenger locomotives, represented the highest state of the art achieved by builders of electric locomotives up to their date of birth.
- They departed from traditional box cab or cab configuration.
- The only second hand locomotives

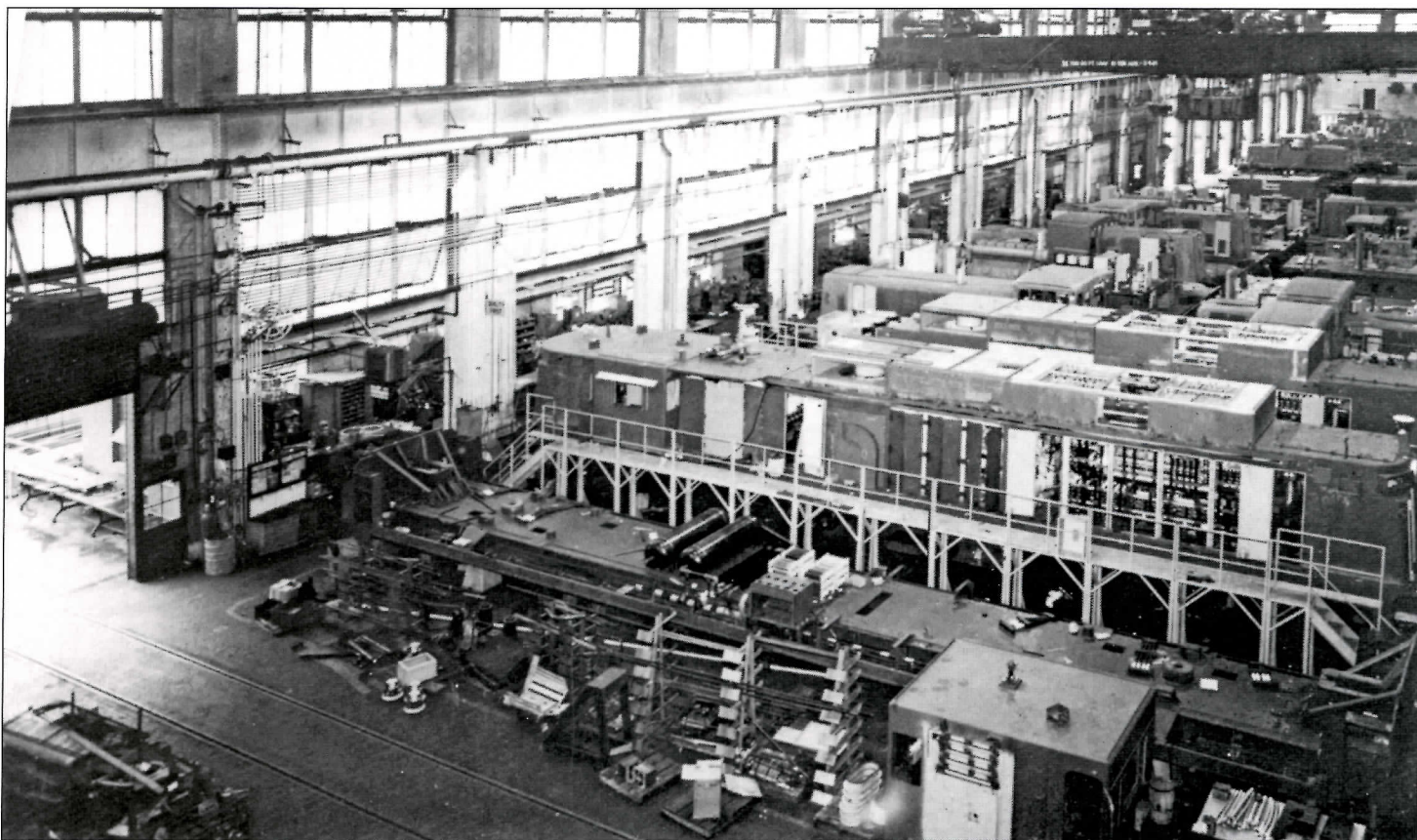
acquired by the New Haven which did not involve the merger of a railroad into the New Haven System.

To better understand the circumstances that made these efficient, modern locomotives available for purchase by the New Haven, let's look at the original owners.

The Virginian Railway had been built by eastern coal interests in the early years of the 20th century to tap the fields of high

quality coal lying in the Pocahontas region, and to transport it by the most efficient means to tidewater at Sewell's Point, Virginia. Being built late in the railroad building timeframe, the Virginian had taken full advantage of the advancement offered in heavy construction equipment and techniques which were not available to the builders of the 19th century Norfolk & Western, which served the same coal fields. Thus the Virginian's route to tidewater was easier than the N&W's. The Virginian Rwy wasn't particularly interested in passenger business, and left that to the N&W, which provided superb facilities for passengers, including the top-notch Hotel Roanoke. The Virginian did provide accommodation trains to its mining towns as long as they were needed. A passenger in the 1940s, wishing to ride the Virginian from end to end could do so, but had to devote two business days riding Pacific hauled locals to accomplish the feat. The Virginian tracks ended at Deepwater, West Virginia, where the passenger train continued on New York Central trackage to Charleston, West Virginia for a decent connection with the outside world. Those hardy souls who rode #3 from Norfolk to Roanoke, then continued from Roanoke to Charleston the next day (still on #3) found the most rewarding portion of the trip west

**This overhead view shows the Virginian rectifiers being assembled at the GE erecting shop at Erie, Pennsylvania. GE photo.**







**Virginian #130 is seen on the East Erie Commercial Railroad's multi-gauged track. GE photo, J. W. Swanberg collection.**

realized it was squeezing all it could out of steam, and cast its eyes towards the early heavy electrification. The Virginian essentially duplicated the Norfolk & Western electrification including using the same type of locomotives. The Virginian strung wires over the toughest grades to enable its original box cab, rodded locomotives to clank between Elmore Yard and Roanoke, a distance of 137 miles. Wires were energized in 1925 and 1926, giving life to the box cab locomotives, propelled by A.C. motors, giving the engineer a choice of two speeds: 14 mph or 28 mph. As delivered, these monsters were semi-permanently coupled in sets of 3 units, although in later years, 2 unit sets were used for switching.

Traffic demands of the 1940s indicated a need for additional electric power. Four class EL-2B two-unit sets of streamlined electrics were produced by GE, weighing 1 million pounds per two unit set, having a continuous rating of 6800 hp. Each unit was supported on four diesel era trucks with D.C. traction motors. Current was converted to D.C from A.C. trolley current by motor generator sets in both carboodies. These were the only streamlined locomotives ever used on the Virginian.

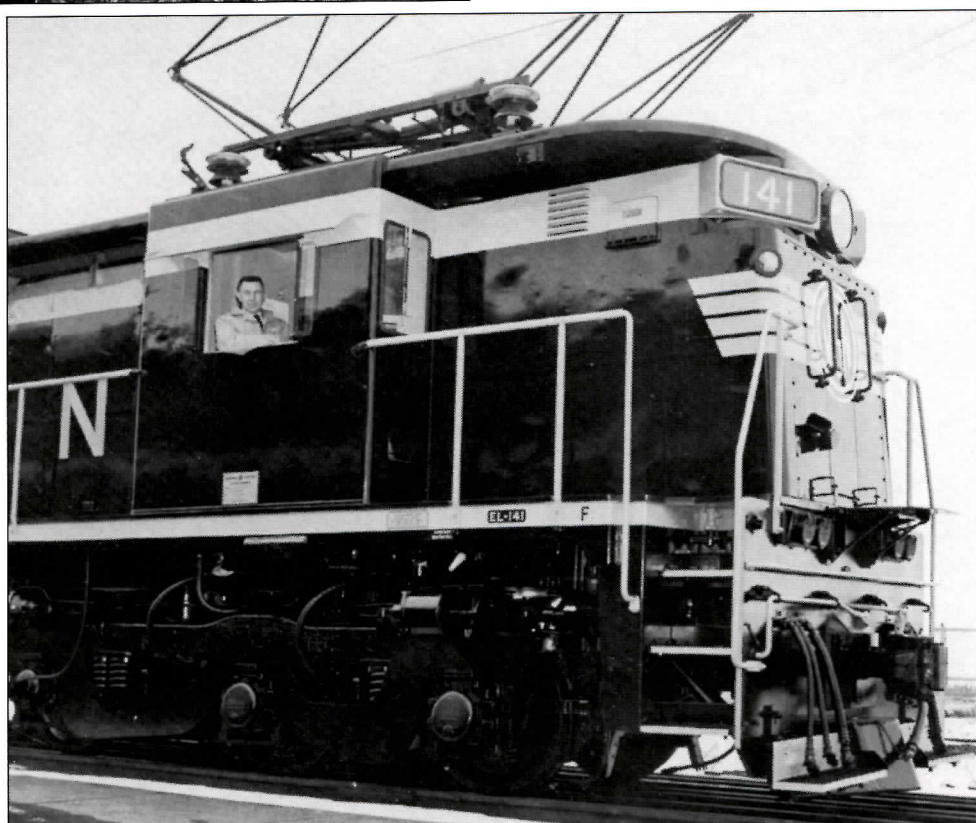
### THE EL-C LOCOMOTIVES

A further increase in traffic, and the need to phase out its first generation of slow, rodded electrics, again brought the Virginian

of Roanoke, after a refreshing night's rest at Hotel Roanoke. The full 466 mile journey behind immaculate Pacifics consumed 32 1/2 hours, including the overnight stay in Roanoke (Shades of Fred Harvey).

The Virginian's specialty was moving one commodity — coal. To this end, the early Virginian Railway had purchased some massive compound Mallets, and even a Triplex (built on the general arrangement of an Erie Triplex) to haul coal east out of its Elmore Yard, near Mullens, West Virginia, up the ten miles of 2.07% grade over Clark's Gap to Princeton and on to Roanoke. Lighter engines had no difficulty taking the coal down the coastal plains from Roanoke to Norfolk. By the early 1920s, the Virginian

**Scowling front end of #141 reveals the slope built into the front section of the EL-C hoods, a design feature incorporated to withstand occasional rock slides encountered on the Virginian. GE photo, J. W. Swanberg collection.**







**Left:** One of the GE GL-6878 Ignitron tubes shown in compartment (right). *GE photo.*  
**Above:** Six of the 12 GE GL-6878 Ignitron tubes used on each EL-C locomotive were installed in this outside opening compartment, with doors interlocked to the power circuits, so that doors cannot be opened when the pantograph is raised. The other six tubes were similarly installed on the opposite side of the hood. *GE photo.*

to GE's door early in the 1950s. By now, the Fairbanks-Morse Trainmasters had pushed the steamers aside, and had sold the Virginian management on the road switcher configuration. Thus, the 12 class EL C's were designed and built by General Electric, and delivered to the Virginian beginning in October 1956, numbered 130 to 141.

Although differing from the motor-generator locomotives placed in service in 1948, the new locomotives had the same ability to operate from a high-voltage, A.C. trolley and, at the same time, utilize the standard D.C. traction motor with its advantageous characteristics. This was a factor in stimulating the interest of the railroad management in new electric motive power.

## MECHANICAL DESIGN

The locomotive was designed for both road and switching duty and was generally similar in appearance to the widely used diesel-electric road-switcher.

The entire car body was of fabricated steel construction, electrically welded. The shorter hood was designated as the No. 1, or front, end since the locomotive operated

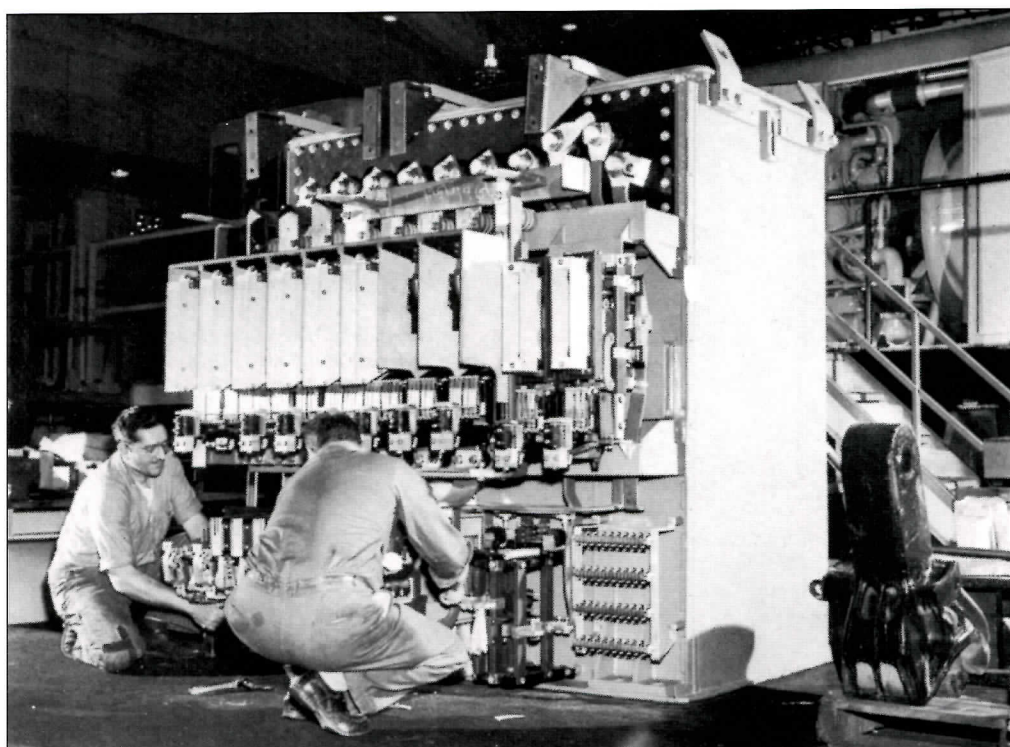
with this end leading the majority of the time. Immediately behind the No. 1 end hood was the engine-man's cab, occupying the full width of the platform. Doors opening on these walkways provided easy access to the equipment for maintenance.

A spring-raised, air-lowered pantograph trolley was mounted on top of the cab. Canopies extended over the outside walkways underneath the pantograph to protect

personnel from contact with high voltage. A high-tension cable extended along the roof from the pantograph to the No. 2 end of the locomotive, where a connection was provided to permit multiple-unit operation of two locomotives back to back with power supplied from one pantograph.

Steps at all four corners of the platform gave access to the outside walkways and engineman's cab. A walkway with chain

**Two technicians work on Type 17KG153 AI GE Control Group (for use on rectifier locomotives) prior to installation. Photo courtesy GE.**





guards permitted passage between locomotive units when operating in multiple. Both steps and walkways were fitted with suitable handrails and illuminated for increased safety. Adequate lighting was also provided in the apparatus compartments for maintenance purposes.

The locomotive platform was fabricated from steel plates and structural shapes by electric welding. It was designed with sufficient strength to support the equipment and withstand an impact force of 1,000,000 pounds. The ends of the platform were heavy steel plate, extending to within five inches of the rail, and were strongly braced. The purpose of this design was to prevent damage and possible derailment when encountering rock slides in the mountainous territory where these locomotives operated.

Two 3-axle trucks supported the platform by a center plate and loading pad arrangement. These trucks were side equalized and had cast steel frames with rigid bolsters. Roller bearing journal boxes were used, and the journal box pedestal guides were fitted with renewable manganese steel wear plates welded in place. Trucks used the same GE 752 traction motors and 74/18

#### PRINCIPAL WEIGHTS AND DIMENSIONS

Weight, full loaded .....	394,000 lb.
Weight, per driving axle .....	65,670 lb.
Length inside knuckle .....	69 ft. 6 in.
Height over roof .....	15 ft. 4 $\frac{1}{8}$ in.
Height over pan locked down .....	15 ft. 10 in.
Width over cab sheets .....	10ft. 0 in.
Width overall .....	11 ft. $\frac{1}{4}$ in.
Total wheel base .....	52 ft. 9 $\frac{3}{4}$ in.
Rigid wheel base .....	13 ft. 0 in.
Distance between center plates .....	45 ft. 0 in.
Wheel diameter .....	40 in.
Coupler height .....	34 in.
Clearance under gear case .....	4 $\frac{1}{2}$ in.
Minimum curve .....	274 ft.
Sand capacity .....	44 cu. ft.
Main reservoir capacity .....	60,000 cu. in.
Continuous rated h.p. ....	3300

gear ratio as the FM Trainmasters, with the result that the trucks of the Trainmasters were sometimes interchanged with those of an EL-C. The Virginian had purchased a pair of spare Trainmaster trucks, which could occasionally be found under an electric, while the slab-equalized Adirondack Foundries truck used on the GEs were sometimes spotted under a Trainmaster.

#### EQUIPMENT ARRANGEMENT

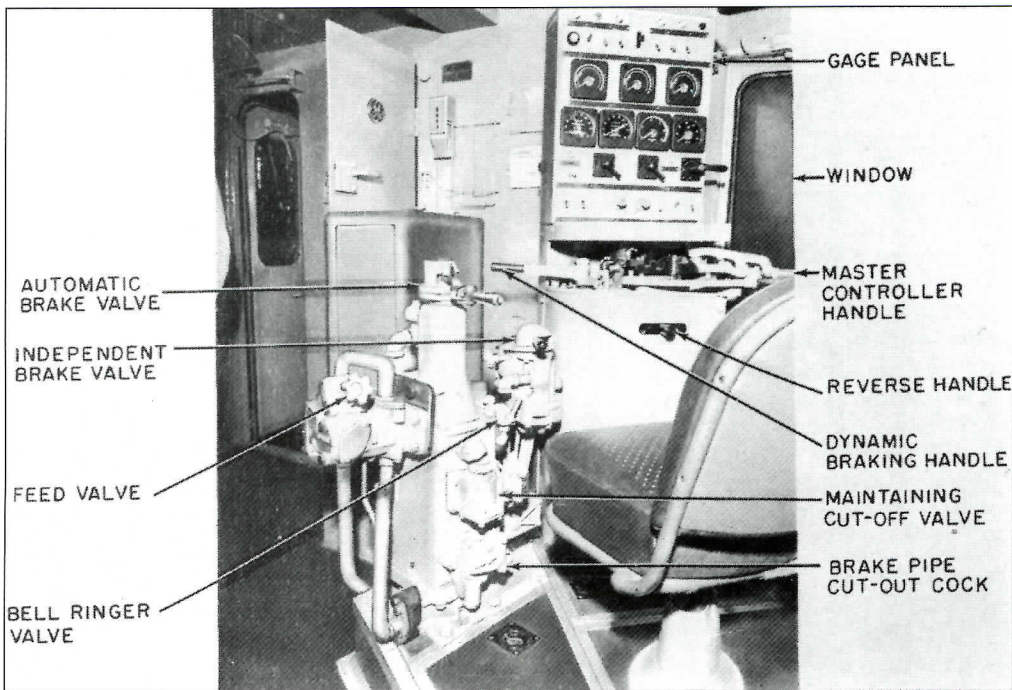
Miscellaneous equipment, such as air brake apparatus, motor-generator set, hand brake and hand-operated air pump were located in the No. 1 end cab. Here it was readily accessible by means of a door from the engineman's cab.

The engineman's cab extended the full

Virginian #136 and #137 were photographed at Roanoke, Virginia in August 1959. Photo by J. W. Swanberg.







Above: This photo shows the interior cab arrangement with identifications of appliances and controls. *GE Photo*. Right: This EF-4 control stand was photographed after being freshly refurbished in the New Haven's shop. *New Haven Railroad photo. J. W. Swanberg collection.*



width of the platform to give good vision in both directions of locomotive movement. Access could be had from either side of the locomotive, or from the No. 1 end cab. Raised platforms for the crew's seats were located on either side at the front end of the cab. The master controller, air brake stand, instrument panel, and other necessary controls were conveniently arranged at the engineman's position. Three separate switches were used. One each operated the

sanders under the leading wheels of each truck for either direction; and a third operated all sanders for both directions. End and side windows gave ample visibility. The side windows slid horizontally, allowing the crew further freedom of movement when performing switching operations. Ample heat, illumination and ventilation were provided in the cab.

The main equipment cab extended from the engineman's cab to the rear end of

the locomotive. It housed the principal pieces of equipment.

A relay compartment formed the rear bulkhead that required manual operation while the locomotive was in service.

Next to the relay compartment was the Pyranol-filled (Registered trademark of the General Electric Company), force-ventilated main transformer, which utilized the full height and width of this section. It was rated 4300 kva, 11,000/2158/392 volts, 25 cycles,

Virginian #136 and #137 were photographed at Roanoke, Virginia in August 1959. *Photo by J. W. Swanberg.*





single phase. Included on the transformer cases were tap switches that supplied a variable voltage to the rectifiers and traction motors, a pump to circulate the transformer coolant, and other switchgear necessary for operation. The high-voltage bushing extended through the roof, so that all 11,000-volt circuits were confined to the roof.

Located adjacent to the transformer switch gear was the high speed, flux-shifting type circuit breaker. This was used to quickly clear the main power circuit from high-current faults that may have occurred in the rectifier circuits.

The equipment blower was housed next to the high-speed breaker. Air for ventilating the equipment and traction motor resistors was drawn through screens located near the roof. The blower was a large, 2-stage, axial flow type with an air-cleaning feature, and was rated 35,400 cubic feet per minute. It forced air downward through a water-cooling radiator into a duct in the platform. From here the air was distributed to the transformer, rectifiers, reactors and traction motors. The blower motor was a single-phase, 25-cycle, 125-hp induction motor operating at approximately 1475 rpm.

The rectifier compartment housed the twelve GL-6878, 12-inch Ignitron rectifier tubes with their associated firing circuit apparatus. The compartment consisted essentially of two cubicles, each housing six tubes, separated by middle aisles. Access to the rectifiers was obtained by means of the outside doors. This permitted easy inspection and maintenance of the rectifier tubes and circuits.

Four iron-core reactors were located between the rectifier cubicles. These were installed and removed through an overhead hatch. The main smoothing reactor was located directly underneath the rectifier section below the locomotive platform. It was an iron core, 2-coil type, and was used in the motor circuit to suppress the ripple current in the output of the rectifier tubes. It was of the dry-type, force-air cooled, insulated for operating voltages in excess of 2000, and carried the current of three motor circuits. Its location resulted in the direct interconnections for the large power circuit cables. Being beneath the locomotive platform, some objectionable magnetic features were eliminated and, at the same time, the center of gravity of the locomotive was kept low.

Also included in the rectifier compartment was a water pump and temperature regulating system required to maintain the temperature of the rectifier tubes within its operating values. A 3-way regulating valve ensured that the water temperature was closely controlled at approximately 43 degrees C. The rectifier coolant was cooled by a water-to-air heat exchanger located in the equipment blower compartment.

GENEALOGY TABLE				
General	VGN.	N&W	New	PC/
Electric	Rwy	EL-C	Haven	Conrail
s/n	EL-C		EF-4	E33
32543	130	230/180*	-311	-
32544	131	231	300	4601
32545	132	232	301**	-4600
32546	133	233	302	4602
32547	134	234	303	4603
32548	135	235	304	4604
32549	136	236	305	4605
32550	137	237	306	4606
32551	138	238	307	4607
32552	139	239	308	4608
32553	140	240	309	4609
32554	141	241	310	4610

\* 230 converted to unsuccessful hump slug No. 180 by N&W; assigned No. 311 by NHRR but only used for parts.

\*\* NH No.301 had accident damage; assigned to No. 4600 by PC but scrapped 1970.

A transverse aisle through the cab separated the rectifier and control compartments and provided access to the rectifier temperature regulating equipment as well as to the central aisle of the control compartment.

The majority of the control equipment was contained in two control sections separated by an aisle. It was accessible from either this central aisle or from the outside walkways, thus assuring maximum ease of access for inspection and maintenance.

Located in the control compartment were the line breakers, an air-operated cam switch containing 12 contactors, the reversers, the dynamic braking contactors, the contactors for the auxiliary motors, and certain miscellaneous relays and resistors.

The structure of the control and rectifier compartments provided support for the resistor compartment located directly above them. This arrangement minimized the length of interconnecting cables and bus bars, resulting in a neat, well proportioned package. It also served to keep the heat dissipated by the resistors away from the control compartment.

The rear of the equipment cab housed the air compressor, the compressor governor, and the control air reservoir. The two-stage, three-cylinder motor-driven, WABCO Type 3CM air compressor had a rating of 224 cubic feet per minute at a pressure of

140 pounds per square inch when operating at 725 rpm. It was equipped with suction unloading valves so that it could be started with no load and operated continuously. This feature differed from the conventional start-stop operation of motor-driven compressors, and improved the service life of both motor and compressor. A roof hatch permitted removal of the compressor for overhaul. The control air reservoir was located underneath the hatch cover.

Beneath the platform were located the storage battery and main air reservoirs. The battery consisted of eight trays of four cells each, and had a rating of 114 ampere hours at an 8-hour rate. Its location made it easily accessible from the ground level for inspection and servicing, and at the same time improved ventilation and excluded battery fumes from the cab.

Twin sealed-beam type headlights, marker, classification lights, and illuminated number boxes were built into the hood at each end.

## ELECTRIC CIRCUITS

Single-phase A.C. power was supplied from the trolley wire at 11,000 volts, 25 cycles. This was fed through the pantograph to the transformer. Voltage on the transformer secondary was varied by means of the tap switches, and was fed to twelve lg-



nitron rectifier tubes arranged three in a group, bridge connected.

Rectified power flowed from the tubes through a smoothing reactor to the six traction motors. These were model GE-752, series-wound, axle hung, D.C. motors of the type widely used on diesel-electric locomotives and also for the rectifier motors for the New Haven Railroad. For this application the motor was modified by the addition of a ground brush and flash ring. The six motors were connected permanently in three parallel groups, each group consisting of two motors in series. Acceleration and speed control were obtained by tap changing on the transformer secondary, and by the use of accelerating resistors in series with the motor armatures. The same resistors were also used for dynamic braking. They were force-air cooled, the amount of air being proportional to the heat to be dissipated.

Auxiliaries, such as the motor-generator set, the air compressor, and the equipment blower operated from a 196-volt tap on the main transformer secondary. All auxiliary motors were of the single-phase, A.C. induction type, thereby eliminating inspection and maintenance of commutators and brushes.

Suitable protection was provided for short-circuit and ground faults occurring in the transformer and traction motor circuits. The individual auxiliaries had their own overload protection.

## OPERATING REQUIREMENTS

Operating requirements dictated that these locomotives be capable of multiple-unit operation, up to four units in multiple, in either direction; and that they also be capable of performing both road and switching duty. Moreover, they had to operate in the same train with the motor-generator locomotives furnished the Virginian Railway in 1948.

To meet these requirements, the locomotive was designed to have a continuous rating of 3300 horsepower and a maximum operating speed of 65 mph, with a gear ratio of 74/18 and 40-inch wheels. The total weight was 394,000 pounds, all on drivers. At 25 percent adhesion the tractive effort was 98,500 pounds. At the continuous rating of the motors, the locomotive developed 79,500 pounds tractive effort at 15.75 mph. The maximum braking effort of 63,000 pounds was available from 25 to 15 mph.

## PERFORMANCE

On the Virginian, two units operating in multiple could haul a 3000-ton train eastbound up the 2.07 per cent grade to Clark's Gap at 16 mph. This required a tractive effort corresponding to 20.2 per cent adhesion at the locomotive driving wheels. No sanding was required when the rail was dry. Under adverse rail conditions sanding was

occasionally used to check incipient wheel slips. From Clark's Gap eastbound to Roanoke two units handled a 9000-ton train against a ruling grade of 0.58 per cent. Westbound, from Roanoke to Mullens, two units handled an empty train of 3844 tons (approximately 162 cars). On acceptance runs, two units hauled a 3140-ton train from Mullens to Clark's Gap, and a 10,000-ton train from Clark's Gap to Roanoke. The New Haven would be a piece of cake.

## RUMBLINGS

At about the same time the EL-Cs were being delivered, the hills of West Virginia were shaken by the rumor that the Norfolk & Western was seeking to purchase the Virginian. The benefit of such a merger would be the elimination of much duplicate trackage, and the availability to the N & W of a much improved gradient for its eastbound coal movements. Most coveted of the Virginian routes, was its portion over Blacksburg Hill, cresting a 0.6% grade in a mile long tunnel, as opposed to the N & W's seven miles of 1.0% helper grade between Walton and Christiansburg. After three years of hard negotiations, the N & W absorbed the Virginian Railway on December 1, 1959, and immediately built a track connection to the heretofore rival's tracks at Kellysville, Va., thus enabling the N & W eastbound coal trains to take the easier climb over Blacksburg Hill. This spelled the doom of the

The former #130 seen to the left had been converted to a slug by the N&W. Although it had been assigned New Haven #311, it was never put into service and became a parts supply. *Photo by T. J. Donahue, John Garofalo collection.*







Former Virginian #137, N&W #237, was photographed outside the Lambertson Street Shops, New Haven, Connecticut. Note that the N&W has painted out the name of the former owner. *Photo by T. J. Donahue, John Garofalo collection.*

entire Virginian electrification, as the N & W had no interest in the inflexibility of electrification as opposed to the use of locomotives that could go anywhere track was laid. Thus, the Virginian was the first of many flags to fall in the years since 1960.

## ORPHANS

The EL-Cs were orphans. They were offered for adoption to any and all railroads having suitable power, but none, not even the New Haven, were really interested at the time, since the whole question of electrification was under some question on any road that had it. There was a feeling abroad in the

railroad community that the diesel locomotive offered the best promise of efficient performance. The magnificent EL-Cs languished in the yards of foster parent N & W for 3 years, before a resolution could be made to their fate.

## THE NEW HAVEN EF-4

Patrick B. McGinnis had become the New Haven railroad's chief executive in 1954, and the New Haven was on its way to becoming de-electrified. According to the McGinnis philosophy, wires were obsolete and old fashioned. McGinnis set his eyes on the radical concept of high speed, light-

weight trains equipped to pick up the 600 volt D.C. power on entry to New York's Park Avenue tunnels, as required by local ordinance. With such passenger trains in service, there would be little use for the catenary to New Haven. Freight service to Oak Point and Bay Ridge could be easily dieselized. The problem of the continuance of the electrification had been wrestled by the previous administration of F. C. Dumaine, Jr. and had involved the consideration of replacement or acquiring substitute power for that which was supplied by the Cos Cob power plant, built in 1912. Service adjustments were made, aimed at easing Cos Cob's load. These changes involved the dieselizing of

The former VGN/N&W freight motors are shown at Lambertson Street Shops on August 9, 1963. *Photo by J. W. Swanberg.*







New Haven #300 and #303 were photographed near the New Haven station, New Haven, Connecticut at the head end of GB-2 on August 23, 1964. Note there is no pantograph on #303. Photo by J. W. Swanberg.

advised the following:

1. Refurbish the EF-3s that had not been scrapped, at \$200,000 each
2. Convert some diesel locomotives to electrics by the installation of rectifiers at \$500,000 each.
3. Buy new electrics at \$500,000 each.

## EL-Cs OFFERED TO THE NEW HAVEN

At this point in time it was the trustees good fortune to be offered the ex-Virginian EL-Cs at \$20,000 each, a mere pittance when compared to the alternatives being considered at the time.

## APRIL 17, 1963 MEMO

On April 17, 1963, Vice-President F. J. Orner sent the following memo to H. W. Dorgan concerning the purchase of second-hand electric locomotives:

"The Norfolk & Western Railway Company has offered us a package price of \$300,000 for 12 former Virginian 3300 HP rectifier electric locomotives built by General Electric in 1956. This figure includes in addition to the locomotives, approximately \$32,000 worth of spare parts. Inspection on the ground develops that nine of these units are in generally good condition. Two require replacement of some missing or defective ignitron rectifier tubes, traction motors,

major freight yards at Oak Point, Harlem River and Westchester. Part of Buck Du-maine's plan for the improvement of the electrification had been carried out with the placing of orders for 100 rectifier MU cars (the "wash boards") and 10 EP-5 Ignitron locomotives. The need to protect this 20 or so million dollar investment in new equipment, presumably prevented McGinnis from tearing down the catenary during his stormy administration. So the wires (or at least most of them) stayed up, although they transmitted fewer and fewer kilowatts to pantographs of freight locomotives.

McGinnis succumbed to community pressure in 1956 and resigned. Prior to leaving, he had ordered 30 dual service FL9s from EMD.

The management of the New Haven

then transferred to George Alpert.

The first of 30 of an eventual 60 FL9s arrived in 1957. These locomotives would haul standard passenger trains from one end of the system to the other without requiring an engine change. This spelled "finis" for the bulk of motor hauled A.C. electrification. In 1960, the overhead wires were used to power only the MU fleet and 7 EP-5s. All the other EF- and EP- classes had been either stored or scrapped.

The New Haven descended into its second bankruptcy in 1961. It was at this time the New Haven bankruptcy trustees realized what the underutilization of the electric zone was costing them, in a time of a locomotive shortage. Someone had made a mistake! A report by the consulting firm of Gibbs and Hill commissioned by the trustees

The New Haven reinstalled the catenary to Cedar Hill, and the Virginians were back to hauling freight for their new owner. Motors #304 and #309 are returning from the Cedar Hill receiving yard after cutting off from their train. Photo by H. F. (Casey) Cavanaugh.





gears, wheels, etc. The twelfth unit has been partially dismantled in the course of an experiment on the Norfolk & Western.

If purchased we would plan to use 11 of these units for operating substantially all of the freight service between Cedar Hill and Oak Point-Harlem River-Bay Ridge (10 regularly assigned and one spare) and use the twelfth unit as a source of usable components. Wheel and traction motor assemblies required for repairing the two units would be removed from stored unserviceable DER-2 units now at Cedar Hill.

In order to put these units in operation on our line the following estimated expenditures would be involved.

1) Prepare the 11 units for service including necessary modification to the pantograph to meet New Haven clearances - \$109,000 (not including overheads).

2) Restoration of damaged overhead

**Right:** To celebrate the 100th anniversary of the New Canaan branch, U25B #2524 and EF-4 #306 were sent for display. This was the only time a Virginian was in New Canaan. The photo was taken in July of 1968. *Photo by R. T. Chabot, J. W. Swanberg collection.*  
**Below:** EF-4 motors #307 and #308 are about to pass S.S. 38 Stamford. The train is en-route to the car floats in April of 1968. *Photo by T. J. Donahue, John Garofalo collection.*





catenary on the Long Island Railroad between Fremont and Bay Ridge - \$80,000.

3) Re-installation of catenary removed on the New Haven primarily at Cedar Hill and Oak Point - \$113,000 (not including overheads).

4) Expense to strengthen two bridges at Port Chester - \$180,000 (some of this expense would be necessary in the near future regardless of the purchase of these locomotives and can be deferred temporarily by operating at a 20 mph speed restriction).

5) Expense for movement to our line - \$24,000."

## REINSTALLATION OF WIRE

With the arrival of the EL-Cs (now classed as New Haven EF-4s) in 1963, wire had to be reinstalled in New Haven between the passenger station and Cedar Hill yard. Catenary was also restored at Oak Point yard, and to Bay Ridge, where it had been severed by an air rights structure in Brooklyn. Thus, the extent of the overhead regained its 1927 road mileage minus that of the Danbury branch. Freights between Cedar Hill and the interchange float yards of the New York area were now the near exclusive domain of the red/orange EF-4s.

## WHICH PAINT SCHEME?

On July 29, 1963, Vice-President F. J. Orner sent a memo to H. W. Dorgan concerning the status of paint schemes for the EF-4s. The memo included an attachment of two 11" x 17" color pencil drawings of suggested paint schemes.

"In connection with Mr. McKernan's letter of July 17th proposing a brighter color scheme for the ex-Virginian electric freight locomotives, herewith two sketches prepared by the Mechanical Dept. at my request to meet the suggestion of a brighter color scheme, and to stand up well in use.

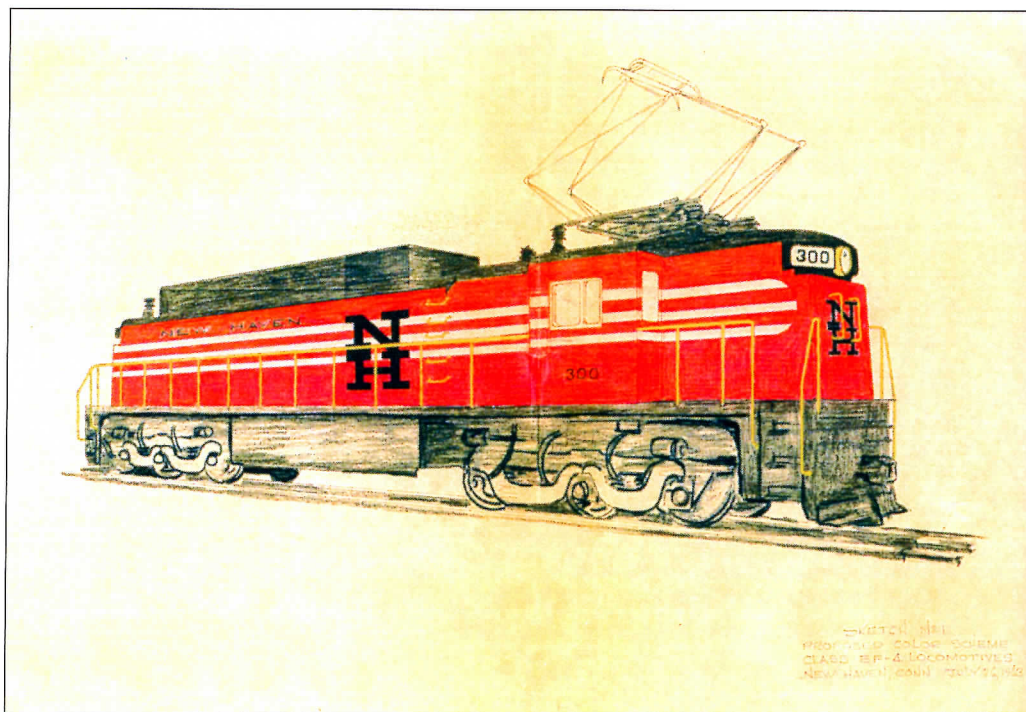
Messrs. McKernan and Raglan have looked at these, and both endorse Sketch No. 2.

As compared with the cost of a solid color Sketch No. 1 would involve the added cost of approximately \$50.00 for each of the 11 units, and Sketch No. 2 an added cost of \$80.00 per unit.

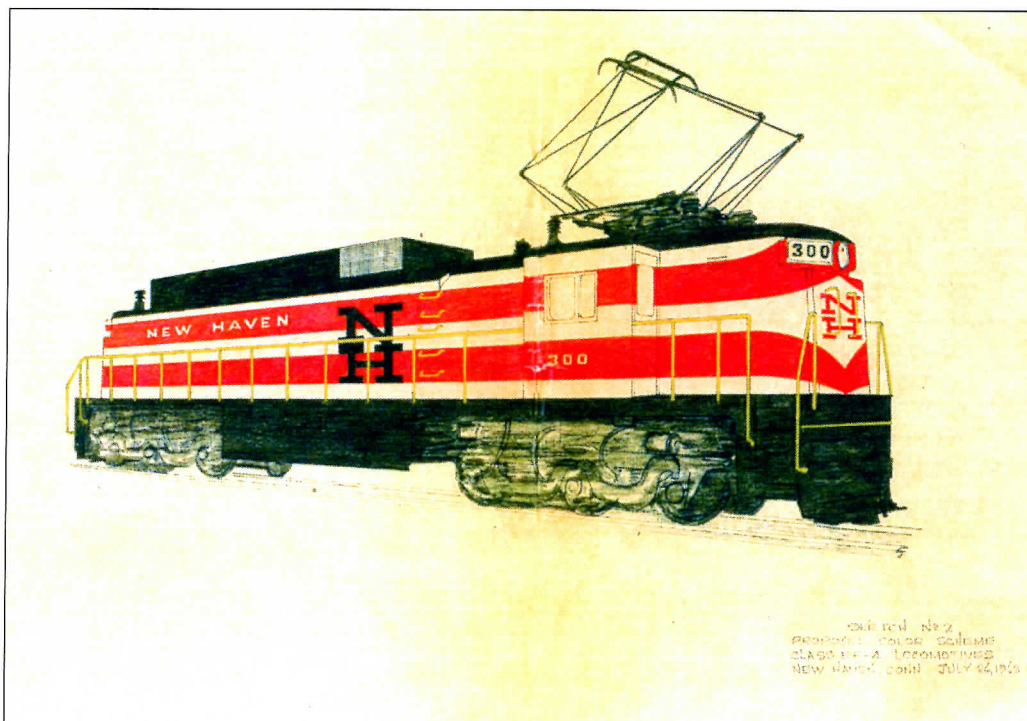
Please advise whether we may proceed with the design the design proposed in Sketch No. 2 which provides an appearance generally similar to our EP-5 electric passenger locomotives.

As information, first three locomotives have been shipped from Roanoke late last week, but have not been received on line as yet."

The July 29 memo was followed on August 9, 1963 with another memo concerning



New Haven's Director of Public Relations, Bob McKernan, selected sketch 2 shown below as his choice for a new paint scheme, however, the trustees on August 7, 1963 decided on adopting the paint scheme illustrated above in sketch 1.



the selection of paint schemes for the EF-4s. It read as follows:

"At the meeting of the Trustees on August 7th, they were agreed on a painting program of the Virginian freight locomotives recently purchased, as outlined under Sketch No. 1 - Proposed Color Scheme."

## PREPARATIONS FOR SERVICE

Although a general overhaul was most

desireable, the New Haven opted to get the motors into service as soon as possible with a minimum investment. In a memo concerning preparation of the EF-4s for service, Vice-President Orner included the following:

"The preparation of this equipment under AFE (Authorization For Expenditure) 80549 was undertaken with the regular maintenance forces. Because of an abnormal amount of electrical maintenance required on EP-5 passenger electric





New Haven EF-4 #304, ex-Virginian #135 / N&W #235 is seen at Lambertson Street Shops freshly painted on August 21, 1963. The #304 was the first of the Virginians to be repainted into the New Haven scheme. *Photo by J. W. Swanberg.*

1, 1964, six more units --- all except #301 -- entered service. The #301 was completed a year later, in June 1965.

On February 27, 1964, the first electrified freight powered by EF-4s operated NG-3 to Bay Ridge.

The EF-4s performed well as long as they were given minimal maintenance. Whereas Virginian practice called for both pantographs to be raised on a two unit lash-up, the New Haven could not afford this practice and the pantograph from one of a pair of locomotives was often borrowed to keep another EF-4 in service. For a period of time, units #301 and #303 sported a one-legged Faiveley pantograph.

locomotives, the working force assigned to the preparation of the Virginian locomotives had to be diverted to regular maintenance. Additional delays were occasioned by the necessity for manufacturing new wheel and axle assemblies. It had been originally planned to utilize assemblies from ALCO locomotives which had been set aside. When these units were sold to ALCO, Inc., the wheel and axle assemblies were no longer available."

The EF-4s were assigned number series 300-311. Although the N&W #180 was

not to be put into service, but used for parts, it did receive the number 311.

### EF-4s ENTER SERVICE

By October 1963, the first two units, #304 and #309, began operating on freight service between New Haven and Oak Point on trains BH-7 and HB-8. On November 1, they were joined by #300 and #302, and the two pairs of engines began rotating in this service. Between January 9, 1964 and May

### A BAD DAY ON THE BAY RIDGE BRANCH

In August, 1966, two EF-4 motors were westbound towards the floats at Bay Ridge, Brooklyn, NY. The track was LIRR owned and operated with full trackage granted rights to the New Haven. According to a brief newspaper account, vandals broke a siding switch lock and threw the iron for the siding of a line side customer. With very little

Symbol freight GB-2 with EF-4s #306 and #302 on the point is at East Bridgeport, Connecticut on August 27, 1964. *Photo by J. W. Swanberg.*







Above: Four EF-4s were required on this train due to a shortage of enough rectifier tubes which cost \$4,350.00 each. NH #300, #302, #309 and #310 on NG-1 were photographed at S.S.14, Pelham Bay, New York on February 5, 1964. *Photo by H. Goldsmith, J. W. Swanberg collection.* Below: On September 17, 1966, fireman J. W. Swanberg took this photo at approximately 11:00 a.m. from the cab of New Haven U25B #2524 which was on the head end of OB-6 from Maybrook. New Haven #301 and #304 were on the freight seen below as it was ready to leave Cedar Hill with a New York bound freight. *Photo by J. W. Swanberg.*







EF-4 #307 and #300 are seen climbing the westbound approach of Hell Gate Bridge in 1964. *Photo by H. F. (Casey) Cavanaugh.*

reaction time the motors plowed into the building and the following train buckled with the associated torn up track and damaged equipment. This incident was the only one involving these EF-4 motors. The motors (only the second motor was identified as #302) were quickly repaired and returned to service, damage was probably minor, as they were well designed and heavily built engines. What is notable is that post WWII accidents in the west end electrified zone were quite rare.

### PENN CENTRAL CLASS E33

The EF-4s survived to become Penn Central class E33. As Penn Central power, they left the confines of the New York-Cedar Hill corridor, and broadened their horizons to such ex-Pennsy ports of call as Jersey City, South Amboy, Waverly, South Philadelphia, Potomac Yard and Enola. Under the Conrail flag, these motors received their fourth herald and a temporary lease on life at Conrail's Harrisburg Shops.

**New Haven EF-4 #301 and companion #302 lead a symbol freight at an unknown location in the electrified zone.**  
*R. L. Abramson collection.*

Conrail's 1981 termination of electric freight service was a sad ending for these useful motors.

Much help in the preparation of the article came from Ben F. Anthony of GE, and from photos and material supplied by Jack

Swanberg. Technical information from AIEE paper presented by J. C. Fox and J. P. Wiles before AIEE Winter Meeting, 1/22/57. Thanks also to Wayne Drummond for his information regarding the August, 1966 derailment.





# EF-4 EPILOGUE

by J. W. Swanberg

When the ex-Virginian/Norfolk & Western electrics arrived on the New Haven in 1963, they were pretty much as built except for the former VGN 130 / N&W 230, which had been rebuilt by the N&W as a black-painted hump yard "slug" trailer unit and renumbered N&W 180 (the rebuilding was not successful and wasn't repeated). The New Haven did not put this modified unit in service but instead used it as a parts supply; it was assigned No. 311 on paper but was never repainted or put in operation. N&W 231-241, the rest of the Virginians, were renumbered in order as NH 300-310.

One-armed Faiveley pantographs were tried on the 301 and 303 in 1965, but were not an unqualified success: the 303's Faiveley was broken off by 1966, although the 301's lasted until 1968. Their rooftop 11,000-volt bus jumpers allowed EF-4 pairs to operate with just one pantograph raised, and some units even ran with no pantograph at all on the money-strapped New Haven (as long as they were paired with a pantograph-equipped EF-4). Money was also saved by running some 300s with less than their 12 expensive rectifier tubes, but this resulted in occasional four-unit EF-4 sets to make up for the resulting tractive-effort loss. When Penn Central took over in 1969, sin-

gle-unit EF-4s were tried on Harlem River trailer jobs, but this was unsuccessful due to no turning facilities at Harlem River requiring long-hood-forward operation back to New Haven, with poor vision ahead for the engineer. But the Virginians were well-designed locomotives indeed and never suffered the troubles of the New Haven's EP-5 "Jets", because they had no space restrictions and thus had plenty of room between electrical components. They were a great success on the New Haven, and they enabled a great (albeit lucky) recovery by the Trustees from the disastrous McGinnis/Alpert dieselization of electric zone freight service.

Penn Central had other ideas, though, and in early 1969 the Virginians were taken to the ex-Pennsylvania RR shops at Wilmington, Del., where they were repainted PC black and renumbered in the 4600 series (301 had accident damage, and although assigned PC 4600 was retired in 1970; the 300 and 302-310 became PC 4601-4610, Class E33). The Virginians were just as successful on the PC as they had been on the New Haven, and they continued to run after Conrail took over in 1976. But CR terminated all electric freight service in 1981, and then the Virginians were truly out of a job, even though they had survived four rail-

roads; most of them were scrapped by General Electric at Erie, Pa. in the mid-1980s. You can't keep a good locomotive down, though, and two Virginians survive today: Ex-NH 304 is preserved at Roanoke, VA, repainted as Virginian 135, and ex-NH 300 is at the Illinois Railway Museum awaiting restoration to her attractive NHRR white-striped red/orange livery. Painting a large locomotive is not cheap, so let's all chip in and help the IRM restore the 300 to its former New Haven glory.

**Below: Former New Haven EF-4 #302 is still in New Haven paint, but with Penn Central renumbering as PC #4602. The motor was photographed on January 25, 1969, at Wilmington, Delaware. Photo by J. W. Swanberg. Opposite Page Top: PC #4605 ex-NH #305 was photographed at Bay View Yard on March 22, 1969. Photo by J. W. Swanberg. Opposite Page Middle: This postcard photo shows Conrail E33 #4608 just repainted at Harrisburg, Pennsylvania, and serving its fifth owner on May 29, 1977. Photo by Mark S. Saxon. J. W. Swanberg collection. Opposite Page Bottom: Virginian #135 is now at the Roanoke Transportation Museum at Roanoke, Virginia. Photo by Charles A. Schrade, J. W. Swanberg collection.**





